July 6, 2004

Mr. Michael Kansler
President
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - EXTENDED POWER UPRATE, VERMONT YANKEE NUCLEAR POWER STATION (TAC NO. MC0761)

Dear Mr. Kansler:

By letter dated September 10, 2003, as supplemented on October 1, 2003, October 28, 2003 (2 letters), January 31, 2004 (2 letters), March 4, 2004, and May 19, 2004, Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc., submitted a proposed license amendment to the U.S. Nuclear Regulatory Commission (NRC) for the Vermont Yankee-Nuclear Power Station (VYNPS). The proposed amendment, "Technical Specification Proposed Change No. 263, Extended Power Uprate" would allow an increase in the maximum authorized power level for VYNPS from 1593 megawatts thermal (MWT) to 1912 MWT.

The NRC staff is reviewing your submittal and has determined that additional information is required to complete the review. The specific information requested is addressed in the enclosure.

We request that the additional information be provided by July 30, 2004. The response timeframe was discussed with Ms. Ronda Daflucas of your staff on June 30, 2004. If circumstances result in the need to revise your response date, or if you have any questions, please contact me at (301) 415-1420.

Sincerely,

/RA/

Richard B. Ennis, Senior Project Manager, Section VY
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-271

Enclosure: As stated

cc w/encl: See next page

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OFFICE	PDI-VY/PM	PDI-VY/SC
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DATE	06/30/04	07/06/04

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Vermont Yankee Nuclear Power Station

cc:

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REQUEST FOR ADDITIONAL INFORMATION

REGARDING PROPOSED LICENSE AMENDMENT

EXTENDED POWER UPRATE

VERMONT YANKEE NUCLEAR POWER STATION

DOCKET NO. 50-271

By letter dated September 10, 2003, as supplemented on October 1, 2003, October 28, 2003 (2 letters), January 31, 2004 (2 letters), March 4, 2004, and May 19, 2004 (References 1 through 8), Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc. (Entergy or the licensee), submitted a proposed license amendment to the U.S. Nuclear Regulatory Commission (NRC) for the Vermont Yankee Nuclear Power Station (VYNPS). The proposed amendment, "Technical Specification Proposed Change No. 263, Extended Power Uprate" would allow an increase in the maximum authorized power level for VYNPS from 1593 megawatts thermal (MWT) to 1912 MWT.

The NRC staff is reviewing your Extended Power Uprate (EPU) amendment request and has determined that additional information is required to complete the review. The specific information requested is addressed in the following request for additional information (RAI). Note, the question numbers are a continuation of the numbering used in the RAI issued by the NRC on May 28, 2004.

Enclosure

Plant Systems Branch (SPLB)

Balance of Plant Section (SPLB-A)
Reviewer: Devender Reddy

7. Spent Fuel Pool Cooling and Cleanup System:
(Reference 1, Attachment 6, Section 6.3)

a) Spent Fuel Pool (SFP) Cooling Capacity:

Please describe the analyses that were performed and assumptions and input parameters that were used for the proposed EPU to address the following review criteria in NRC Review Standard, RS-001, Attachment 2 to Matrix 5, "Supplemental Spent Fuel Pool Cooling Review Criteria," Section 3.1.1.1:

i) heat removal capability is based on bounding estimates of ultimate heat sink temperature, cooling system flow rates, and heat exchanger performance (e.g., fouling and tube plugging).

ii) alternate heat removal paths (e.g., evaporative cooling) should be appropriately validated and based on bounding input parameter values (e.g., air temperature, relative humidity, and ventilation flow rate).

b) Heat Removal Capability and Limiting Case for Core Offload:

Table 6-3 in Attachment 6 to Reference 1 provides five SFP cooling/core offload configurations. Please update this table to include the following configurations discussed in the VYNPS Updated Safety Analysis Report (UFSAR), Section 10.5.5, page 10.5-9, third paragraph:

i) Limiting Normal Batch (one-third core) Offload: One train (one heat exchanger and one pump) of Standby Fuel Pool Cooling Subsystem (SFPCS) in service, and

ii) Limiting Full Core Offload: Both trains (two heat exchangers and two pumps) of SFPCS in service.

Also, discuss the assumptions and input parameters that were used in the analyses for the two additional configurations discussed above and confirm that they are consistent with the existing plant licensing basis and that the worst-case ultimate heat sink temperatures were used.

8. Service Water Systems (SWS):
(Reference 1, Attachment 6, Section 6.4)

a) In Section 6.4.1.1 of Attachment 6 to Reference 1, it is stated that:

“The performance of the safety-related portion of the SW system during and following the most demanding design basis event, the LOCA, was demonstrated. Adequate SW system heat transfer capabilities exist at CPPU [constant pressure power uprate] to support the above components. In addition, the SW flow rates do not change.”

i) With regard to performance, heat-loads, heat transfer capabilities, flow rates, and flow velocities in the SWS for post CPPU conditions, please explain how the above conclusions were reached.

ii) Also, describe the analyses that have been performed, assumptions, and input parameters that were used; and explain the impact of the proposed EPU on UFSAR Section 10.6.4, Safety Design Bases, Items 1, 2, and 3.

b) Regarding the Residual Heat Removal Service Water (RHRSW) system, in Section 6.4.1.3 of Attachment 6 to Reference 1, it is stated that:

“The post-LOCA containment and suppression pool responses have been calculated based on an energy balance between the post-LOCA heat loads and the existing heat removal capacity of the RHR and RHRSW systems. As discussed in 3.5.2 and 4.1.1, the existing suppression pool structure and associated equipment have been reviewed for acceptability based on this increased post-LOCA suppression pool temperature....Thus, the RHRSW system has sufficient capacity to serve as the coolant supply for long-term core and containment cooling as required for CPPU conditions. The RHRSW system flow rate is not changed.”

i) With regard to performance, heat-loads, heat transfer capabilities, flow rates, and flow velocities in the RHRSW system for post CPPU conditions, please explain how the above conclusions were reached.

ii) Also, describe the analyses that have been performed, assumptions, and input parameters that were used; and explain the impact of the proposed EPU on the UFSAR Section 10.7.4, Safety Design Bases, Item 1.

c) Confirm that the analyses performed for the proposed EPU are consistent with the existing plant licensing basis and that the worst-case ultimate heat sink temperature was used in calculating flow requirements of the safety-related SWS and the RHRSW systems for the proposed CPPU conditions.

d) Please describe any impacts that the proposed EPU will have on the issues discussed in Generic Letters 89-13, “Service Water System Problems Affecting Safety-Related Equipment,” 96-06, “Assurance of Equipment Operability and Containment Integrity during Design Basis Accident Conditions,” and 96-06, Supplement 1, including the basis for your determination. In particular, confirm that water hammer and two-phase flow will not occur in the SWS, RHRSW, and other safety-related cooling water systems due to the EPU. Also, confirm that the power uprate will not result in overpressurization of water-filled piping between containment isolation valves.

9. Ultimate Heat Sink (UHS) / Alternate Cooling System (ACS):
(Reference 1, Attachment 6, Section 6.4.5)

a) In Section 6.4.5 of Attachment 6 to Reference 1, it is stated that:

“The ACS was evaluated for CPPU in a manner that is similar to the UHS evaluation for newer plants (e.g., inventory requirements and heat removal capability with increased decay heat)....The heat removal requirements of the following affected components during the ACS operating mode have been evaluated and found to be acceptable at CPPU....”

i) With regard to performance, heat-loads, heat transfer capabilities, flow rates, and flow velocities in the ACS for post CPPU conditions, please explain how the above conclusions were reached.

ii) Also, describe the analyses that have been performed, assumptions, and input parameters that were used; and explain the impact of the proposed EPU on UFSAR Section 10.8.2, Safety Design Bases, Items 1, 2, and 3.

b) In Reference 5, Attachment 6, MATRIX 5, Page 8, SE 2.5.3.4, it is stated that no SW flow or SW supply temperature changes are required to support the CPPU normal, LOCA or shutdown operations. Please explain.

c) Confirm that the analyses performed for the proposed EPU are consistent with the existing plant licensing basis and that the worst-case ultimate heat sink temperature was used in calculating flow requirements of the ACS for the proposed CPPU conditions.

d) In Reference 1, Attachment 6, Section 6.4.5, as well as in Reference 5, Attachment 6, MATRIX 5, Page 8, SE 2.5.3.4, it is stated that a modification to re-circulate ACS (RHRSW) pump motor cooler water back to the cooling tower, instead of discharging it to the river, is planned to ensure adequate inventory to meet the 7-day requirement associated with the ACS design-basis functional scenario. Please provide a description of the modification, including a flow diagram. In addition, discuss the regulatory requirements applicable to the modification.

Probabilistic Safety Assessment Branch (SPSB)

Containment and Accident Dose Assessment Section (SPSB-C)
Reviewers: Richard Lobel (Containment), Harold Walker (HVAC), Michelle Hart (Dose)

28.* Provide additional information regarding the potential impact of the CPPU on those HVAC systems discussed in the Standard Review Plan sections 6.4, 6.5.1, 9.4.1, 9.4.2, 9.4.3, 9.4.4 and 9.4.5. This should include a discussion of the impact, if any, during both normal and post-accident operations resulting from increases in heat loads due to CPPU and the bases for your determination of system acceptability post-CPPU.

*Note, this question was previously transmitted to the licensee via e-mail on June 3, 2004.

29. Please provide the design basis and realistic values of inputs used in the determination of emergency core cooling system (ECCS) pump available net positive suction head (NPSH) (i.e., the values used in the MAAP probabilistic risk assessment (PRA) calculations and the SHEX calculations). Please include:

a) service water temperature
b) initial containment temperature
c) initial containment pressure
d) initial drywell and wetwell humidity
e) initial suppression pool temperature
f) drywell and wetwell airspace volume
g) suppression pool water volume

30. Please describe how containment leakage is modeled in the design basis NPSH calculations. Is MSIV leakage included? If not, why not?

31. The VYNPS Individual Plant Examination (IPE) report dated December 21, 1993 (Reference letter BVY 93-139), Section 3.1.2.1, “Large LOCA Event Tree,” Event AI (Alternate Injection), models the failure of long-term core cooling due, in part, to "loss of LP/CS NPSH at high suppression pool temperature if the containment vent opens and the operator fails to control pressure by reclosing the vent." Concerning the accident sequence modeling for large LOCAs, describe all differences between the IPE and the PRA performed to support the EPU application.

32. Please provide input to the computer calculation (data in ASCII format) of the minimum containment accident pressure used for ECCS pump NPSH calculations for the double ended guillotine break of a recirculation line. Please verify that the input is consistent with the VYNPS emergency operating procedures. In addition, provide a schematic of containment with dimensions and ECCS schematic for this analysis . The input parameters needed are included in Attachment 1.

33. Please provide the results of the containment accident pressure calculation used for ECCS pump NPSH calculations. Include:

a) drywell pressure vs. time
b) drywell temperature vs. time
c) wetwell pressure vs. time
d) wetwell air temperature vs. time
e) suppression pool temperature vs. time
f) suppression pool level vs. time

REFERENCES

1) Entergy letter (BVY 03-80) to NRC dated September 10, 2003, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Extended Power Uprate”

2) Entergy letter (BVY 03-90) to NRC dated October 1, 2003, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 1, Extended Power Uprate -Technical Review Guidance”

3) Entergy letter (BVY 03-95) to NRC dated October 28, 2003, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 2, Extended Power Uprate - Grid Impact Study”

4) Entergy letter (BVY 03-98) to NRC dated October 28, 2003, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 3, Extended Power Uprate - Updated Information”

5) Entergy letter (BVY 04-009) to NRC dated January 31, 2004, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 4, Extended Power Uprate - NRC Acceptance Review”

6) Entergy letter (BVY 04-008) to NRC dated January 31, 2004, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 5, Extended Power Uprate - Response to Request for Additional Information”

7) Entergy letter (BVY 04-025) to NRC dated March 4, 2004, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 6, Extended Power Uprate - Withholding Proprietary Information”

8) Entergy letter (BVY 04-050) to NRC dated May 19, 2004, “Vermont Yankee Nuclear Power Station, Technical Specification Proposed Change No. 263, Supplement No. 7, Extended Power Uprate - Confirmatory Results”

Attachment 1
Parameters Needed for Question 32

Containment Volume (*upper* uncertainty range)
- drywell (including free volume of vents at low suppression pool water level)
- drywell hold-up volume - i.e., the pool volume prior to falling into the vents
- wetwell atmosphere (at low suppression pool water level)
- wetwell suppression pool (including vent water volume at min. level)
- initial suppression pool depth (minimum)
- initial suppression pool surface area (at min. depth)
- vent lengths and diameters from drywell to wetwell (include number of downcomers)

Initial Pressure (minimum)
- drywell
- wetwell

Initial Temperature (maximum)
- drywell
- wetwell

Initial Humidity (maximum)
- drywell
- wetwell

List all structures (heat sinks) by providing the *upper* uncertainty range for surface area, thickness, material composition, and identify the exposed volume boundary. Include:
- Heat transfer properties (*upper* range) (including description of coatings, if applicable)
- Consider heat transfer characteristics, e.g., two-sided exposed structures will have half-thickness, the outside boundary of the drywell and torus structures, etc.

Wetwell to Drywell Vacuum Breakers
- Number
- Diameter
- Differential pressure setpoint
- Opening Time
- Loss Coefficient

Rx Building to Wetwell Vacuum Breakers
- Number
- Diameter
- Differential pressure setpoint
- Opening Time
- Loss Coefficient

Containment Leakage (upper range)
- Drywell to Reactor Building; Area & Loss Coefficient
- Wetwell to Reactor Building; Area & Loss Coefficient

Drywell Spray performance
- mass flow vs. time
- temperature vs. time
- Initial spray droplet size (smallest)

Wetwell Spray performance
- mass flow vs. time
- temperature vs. time
- Initial spray droplet size (smallest)

Initial RPV water Level (with expected range)
Recirc Line Diameter and Break Area

SRV Performance (if applicable)
- SRV Discharge flow mass and energy vs. time
- Number
- Diameter
- Differential pressure setpoint
- Opening time
- Loss Coefficient

Recirc Break flow mass and energy vs. time

Decay Heat vs. Time

Pump Heat vs. Time

ECCS injection flowrates/enthalpy versus time from suppression pool to RPV and/or drywell/wetwell sprays

RHR Heat Exchanger
- Heat Removal Performance (assumed single failure)
- upper range for heat transfer with lowest service water temperature